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OPERATION AND MAINTENANCE MANUAL FOR HAND PUMPS

—2ND EDITION



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Agriculture**



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OPERATION AND MAINTENANCE MANUAL FOR HAND PUMPS

—2ND EDITION
U.S.D.A., NAL

MAR 8 2000

Cataloging Prep

November 1999

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Environmental Engineering
Forest Service Northern Region

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ACKNOWLEDGMENTS

Recognition is given to the Forest Service Northern Region Environmental Engineering for their assistance in the preparation of this second edition. Special thanks are extended to Beverly Young, Tom Keyes and Don Senn for their contributions, advice and support during the preparation of this manual.

ACKNOWLEDGMENTS

Gratitude is due to the many friends and colleagues who have helped me in the preparation of this manuscript. In particular, I wish to thank the following individuals for their assistance and support:

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I. INTRODUCTION

The Northern Region's 1999 potable water inventory showed that there are 188 hand pumps in use in that region. Approximately 60 percent of all the water systems at recreation sites in the Forest Service Northern Region utilize hand pumps. Other regions also use hand pumps at sites where electricity is not available. The hand pump is likely to remain a common method of withdrawing well water at Forest Service campgrounds.

The primary reasons for the popularity of the hand pump in the Forest Service are its simple design and its usability at well sites without electricity. Hand pumps also can operate satisfactorily in freezing weather for early and late season use. Generally, the hand pump has proven to be popular with the public. One only has to view the number of old red hand pumps that overlook lawns and flower gardens to sense the nostalgia that is associated with this reminder of the past.

Sanitary surveys on hand pumps in Region One identified some recurring problems at many of the installations. Some of these deficiencies were associated with the design of the hand pump stands, and some were associated with pump installations, such as, drainage, slabs, etc. The Region's standard drawing for the installation of hand pumps was approved in 1978 based on the data gathered from those sanitary surveys.

The purpose of this manual is to provide information on the installation and maintenance of well hand pumps. The manual specifically addresses the operation and maintenance of Monitor hand pumps supplied by Baker Manufacturing Company, Evanston, Wisconsin. The majority of hand pumps that are in current use by the Forest Service are Monitor pumps. For information on parts availability, pricing and procedures not covered in this manual contact Baker Manufacturing at (608) 882-5100.

It is recommended that copies of this manual be distributed to all facilities engineers and district personnel responsible for maintaining water systems.

II. HAND PUMP DESCRIPTION AND OPERATION

A hand pump installation consists of a pump cylinder, drop pipe, pump rod, and pump stand. A typical hand pump installation is shown in figure 1. Figure 2 illustrates the main components of the Monitor 1DFHCS AND 1DFHFS hand pumps.

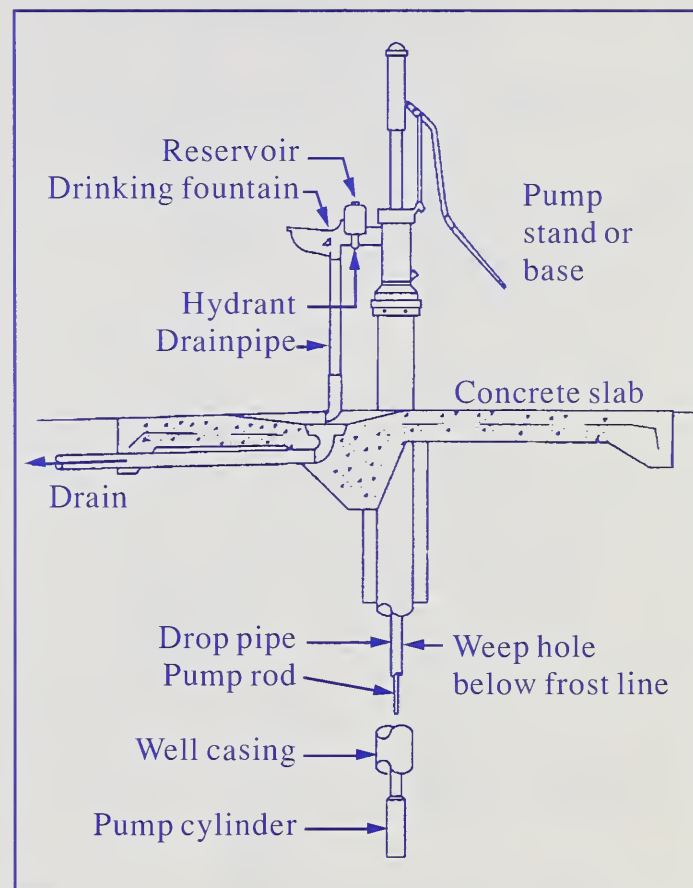


Figure 1—Typical hand pump installation.

The pump cylinder is a single-acting piston pump as shown in figure 3. Figures 4 and 5 are photographs of the pump cylinder assembly. The piston is connected to the pump handle by the pump rod that is installed inside the drop pipe. Operating the pump handle moves the piston up and down in the pump cylinder.

When the piston is drawn upward, gravity and the pressure of the water above it close the valve in the piston. Water above the piston is forced out of the cylinder, up the drop pipe, and out the spigot or fountain on the pump stand. At the same time, water is also drawn into the lower portion of the pump cylinder through the check valve on the bottom of the cylinder.

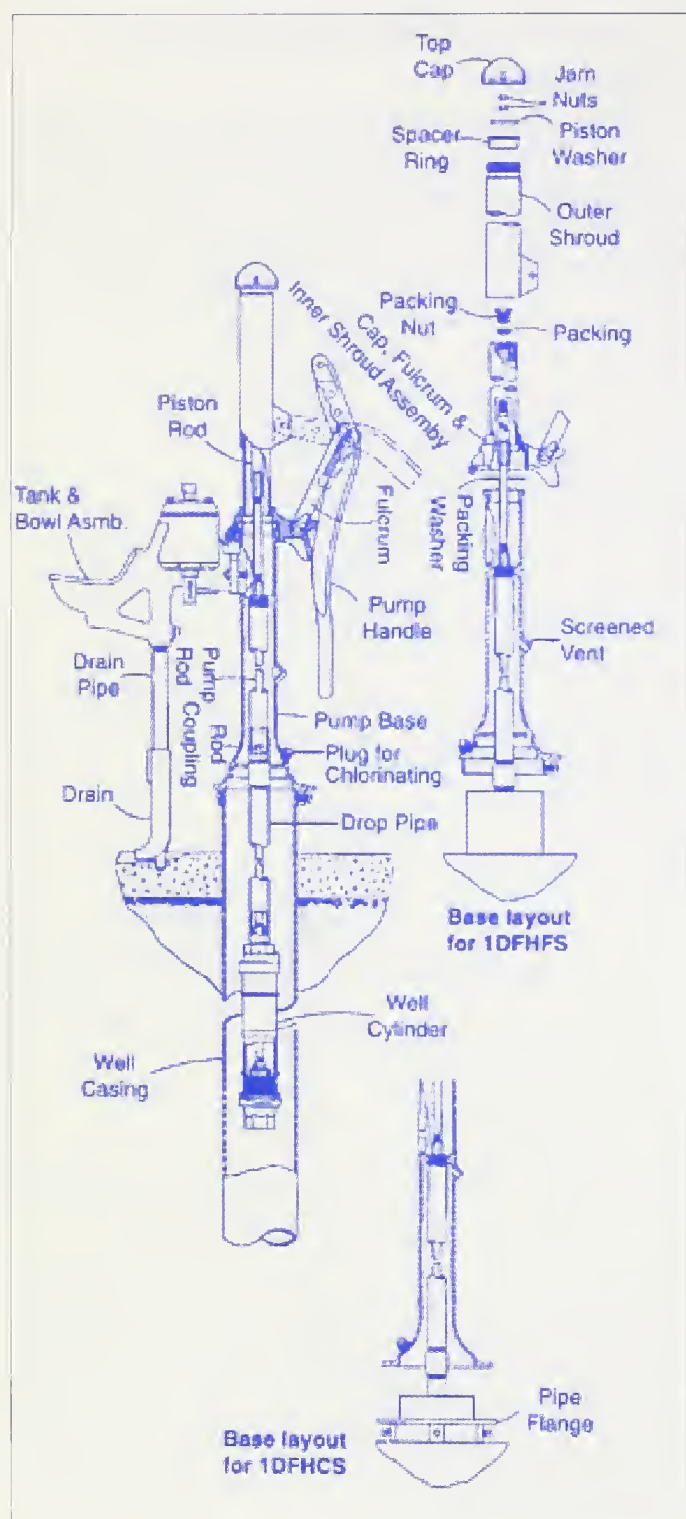


Figure 2—Hand pump assembly components.

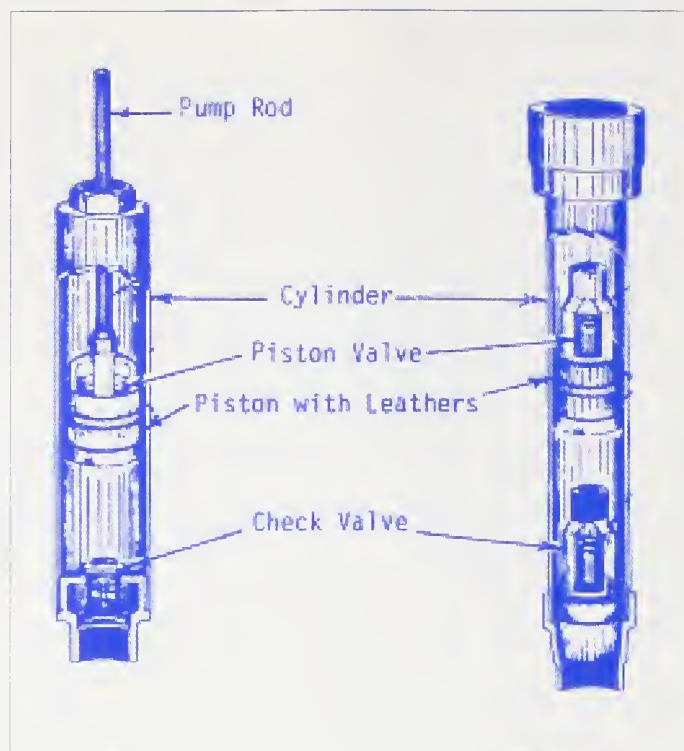


Figure 3—Typical pump cylinders.

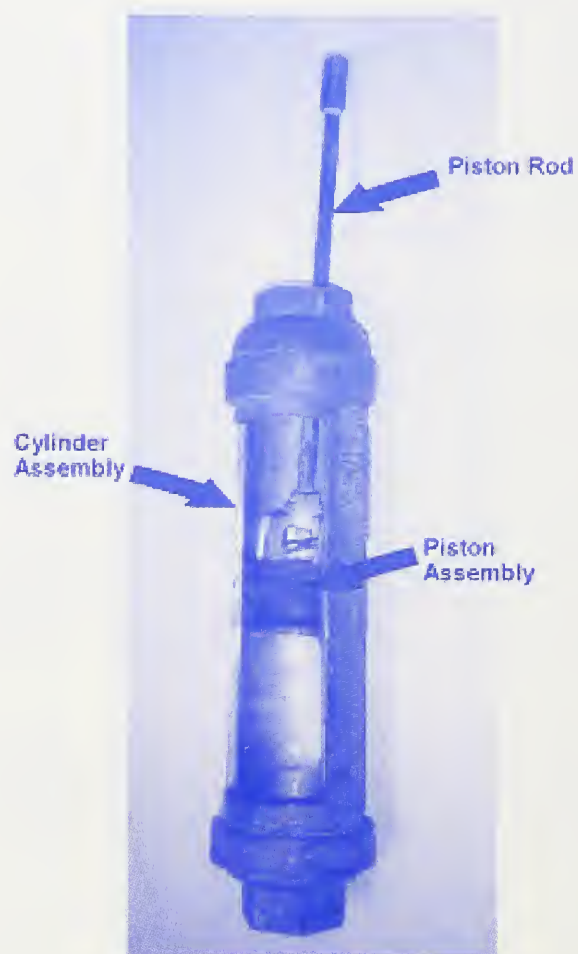


Figure 4—Cylinder assembly.

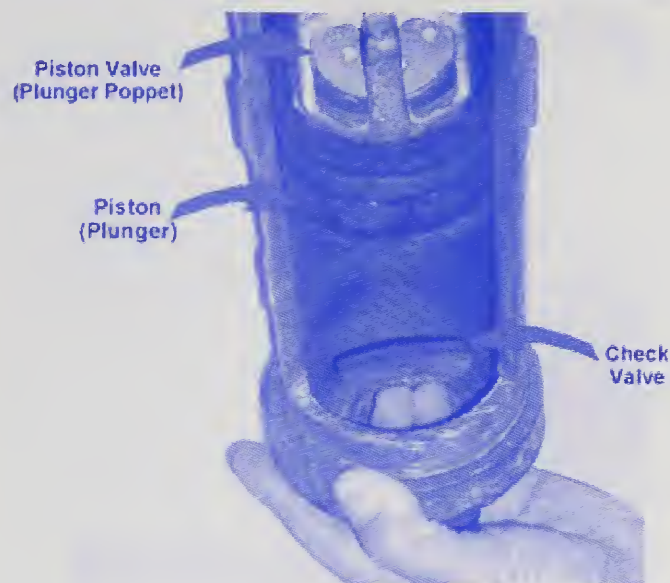


Figure 5—Cylinder valves.

As the piston starts downward, the check valve on the bottom of the cylinder closes and the valve in the piston opens to allow the piston to move to the bottom of the cylinder. Water is trapped in the pump cylinder during the down stroke of the piston, and then is forced upward into the drop pipe on the next up stroke.

The pump stand in the Region One standard hand pump drawing has a drinking fountain and hydrant instead of a spout. A reservoir on the pump stand holds a small amount of water to allow the water to flow out of the drinking fountain for 5 to 10 seconds after pumping is discontinued.

Another pump stand that is available has provisions for treating the water discharged from a hand pump. Figure 6 shows a pump stand with a water treatment base. The water flows out of a fitting at the pump base, through the treatment unit, and back into the bottom of the reservoir unit. Treatment could include filtration, disinfection, ion exchange, etc.

Districts should consult with facilities engineers or zone environmental engineers before considering the installation of a pump stand with a water treatment unit. In general, these units should be considered as the last resort for bacteriological problems at a well site with a hand pump. The treatment system should not be used to cover up obvious sanitary deficiencies in the well hand pump installation.

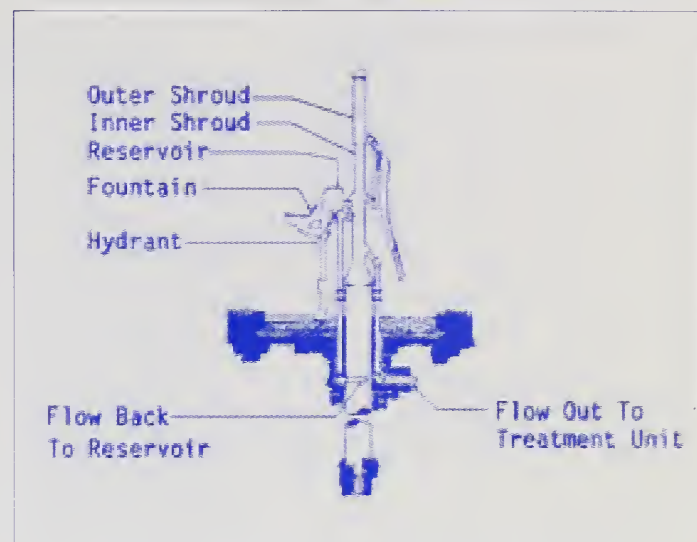


Figure 6—Pump stand with a water treatment base.

III. SAMPLING AND TESTING

Normal operation of a hand pump maintained in good condition should have a minimal effect on the district. System operation should primarily consist of collecting monthly samples for routine bacteriological monitoring.

The procedure for collecting a bacteriological sample is as follows:

- A. Flush the well by pumping for 2 to 3 minutes.
- B. Avoid contamination of the sample at the time of collection.
 1. The sampling bottle shall be kept unopened until the moment the bottle is to be filled.
 2. During sampling, do not touch the threads on the cap and the neck of the bottle. Do not place the cap on the ground while taking sample.
- C. Hold the bottle near the base, fill the bottle 3/4 full, and replace the cap immediately. **DO NOT RINSE THE BOTTLE BEFORE COLLECTING SAMPLE!** Normally a chemical is added to the bottle to neutralize residual chlorine in the water sample.
- D. Complete collection form and return form and sample to the laboratory.

IV. INSTALLATION

Figure 7 is the Region One standard drawing for the installation of hand pumps. The standard drawing has been reviewed and approved by the Montana Department of Environmental Quality. All regions should have an installation drawing approved by the appropriate regional and state authorities. Region One requires that this drawing be used for the installation of hand pumps on new wells and the rehabilitation of existing hand pump sites. The appropriate State authority and the Regional Environmental Health Engineer must approve any deviations from approved plans at sites with public water systems. The Regional Environmental Health Engineer must approve deviations from the plans at remaining sites.

The pump model used in the 1978 Region One standard drawing was the Monitor 1DFHF pump stand. Virtually all of the hand pump installations rehabilitated in Region One prior to 1984 used the 1DFHF pump stand.

Baker Manufacturing quit making the 1DFHF pump stand in late 1983. The company offers the 1DFHFS pump stand as the replacement for the 1DFHF. The Monitor 1DFHFS pump stand is shown in Figure 7. The only difference between the two pump stands is the cap and flat piston bar on the 1DFHF pump were replaced with a shroud on the 1DFHFS pump stand.

The following items should be emphasized for the installation of hand pumps.

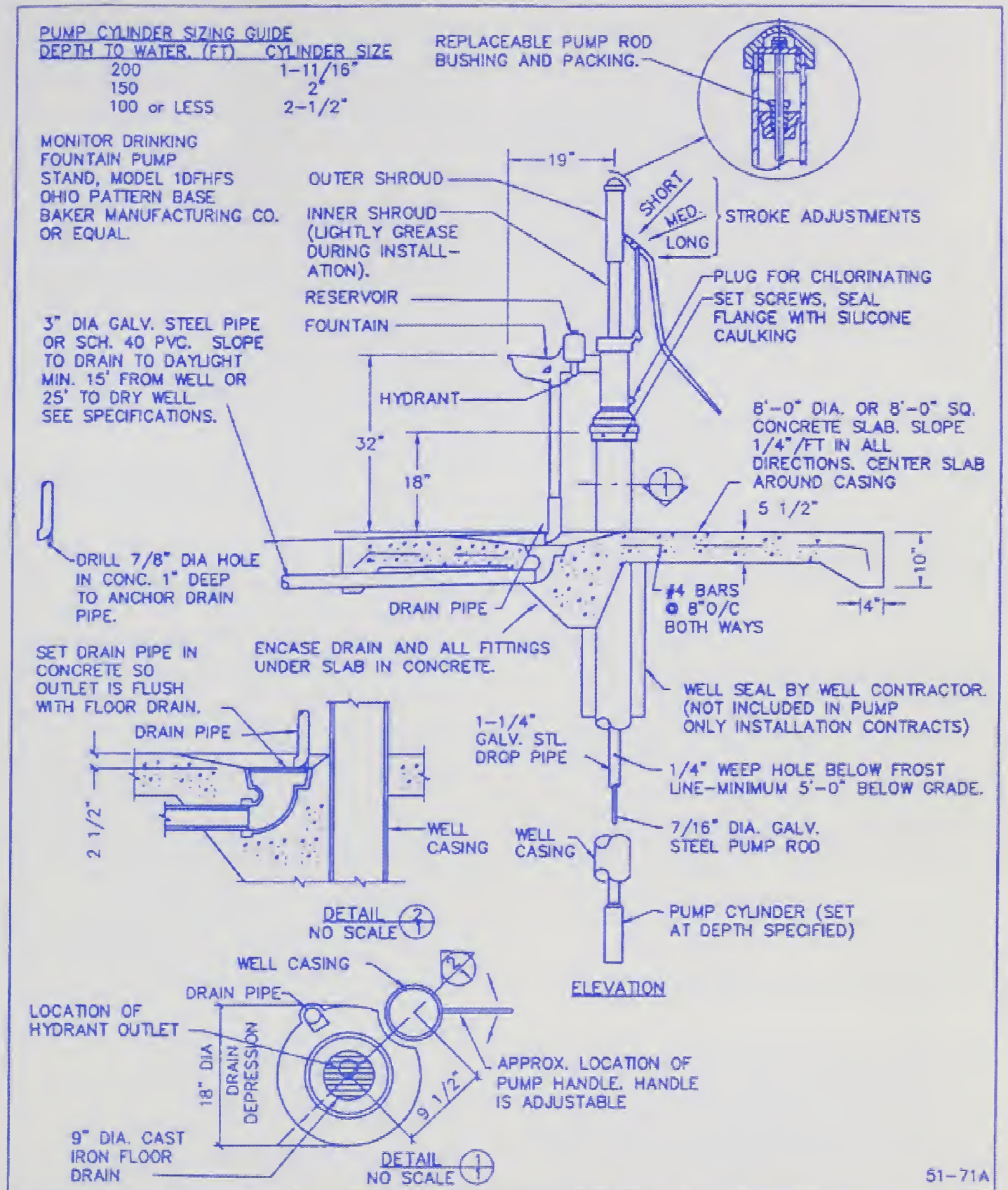
A. Draining excess water away from the concrete slab is important. During rehabilitation of a number of old hand pump installations, several of the wells had developed deep cavities under the old slabs and down along the well casings. These cavities were up to six feet or more in depth. It is likely that excess water seeped under the slab and down along the opening next to the well casing. A small space is sometimes left between the casing and natural ground when wells are drilled. Surface water could percolate down and contaminate the groundwater. Rodents, snakes, etc., could also live in a cavity under the slab and contribute to groundwater contamination.

B. The length of the installed pump rod should be such that the piston does not hit the top of the cylinder when the pump handle is at the bottom of its travel. The constant pounding could cause the pump rod to separate at a threaded joint or damage the pump cylinder or piston. About 1/2-inch to 1-inch of the round piston bar (not including threads) on model 1DFHF pump stands should be visible above the packing nut when the piston is resting on the bottom of the pump cylinder. This will allow the packing to be changed without the top of the threaded piston bar dropping below the level of the packing nut without temporary support. The manufacturer recommends that equal lengths of drop pipe and pump rod should be installed on Monitor pumps. Pump rod is available in standard lengths of 18, 20, and 21 feet, which correspond to the standard lengths of different types of pipe used for drop pipe. Galvanized steel pipe is normally installed for the drop pipe. Pump rods can be shortened by cutting them to the desired length and re-threading the cut end.

C. The weep hole in the drop pipe should be drilled instead of torch cut to ensure that a clean hole of proper size is made. The weep hole can be checked by operating the hand pump until water is discharged from the spout. Let the pump stand idle for 50 to 60 seconds and then operate the pump again. If water is discharged from the spout within the first one or two up-and-down motions of the pump handle, the weep hole is plugged or not large enough.

D. The pump cylinder should be installed below the lowest anticipated level of the water table to eliminate any pollution hazard associated with priming the pump with non-potable water.

E. Substituting another brand of pump for the Monitor pump stand shown on the drawing should not be done unless it is known that the two pump stands are equivalent. Districts should consult with facilities engineers or zone environmental engineers before purchasing another brand of hand pump.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHERN REGION
REGION ONE

Designed Kringer & McNanny Date 4-78
Approved McNanny Date 5-8-78
Revisions 1-7-80 2-25-82 4-8-81 5-5-88
Revisions

Sheet Title
HAND PUMP DETAIL
Scale 1" = 2'-0"
Sheet of

Figure 7—Region 1 standard hand pump installation drawing.

F. The hydrant outlet should be located over the floor drain.

G. In older installations there is an access port (threaded plug) near the top of the well casing. Current models have a threaded plug in the pump base allowing:

1. The well to be disinfected without removing the pump.
2. The access port is convenient for measuring the water level in the well.

V. START-UP AND SHUT-DOWN

A condition survey should be performed on each hand pump installation in the spring before system start-up and after the system is shut-down in the fall. Year-round sites that have hand pumps should have a condition survey performed at least once a year.

A condition survey is simply a physical inspection of the hand pump. Typical items to be checked on a condition survey are summarized below.

- A. Drainage system should be open and functioning properly.
- B. Concrete slab should not be cracked and burrows under this slab should be filled.
- C. Nuts and bolts tight, gaskets intact at watertight joints.
- D. Pump stand and major components not cracked or broken.
- E. Packing nut and packing checked for wear; hole in packing nut not worn oblong; packing nut not bottomed out because packing worn out. Check upper piston guide on model 1DFHF and 1DFHC pumps.
- F. Weep hole open.

A condition survey performed when the system is shut-down in the fall is useful in identifying maintenance items that should be corrected before the system is opened for the next season. Materials can be ordered during the winter to be on hand for

installation early next season. A condition survey before system start-up can determine if any additional damage has occurred during the winter from vandalism, frost action, etc.

Start-up

- A. Perform condition survey.
- B. Complete necessary maintenance repairs.
- C. Install pump handle.
- D. Loosen and readjust packing nuts on Monitor 1DFHC and 1DFHF pump stands. Add packing if necessary.
- E. Flush well by pumping until discharge is clear of rust, sediment, etc.
- F. Sample water for bacteriological testing. Remove pump handle.
- G. Install the pump handle. If bacteriological test is satisfactory, the water system may be opened for use.
- H. Chlorinate the well and let it stand for a minimum of four hours. If the bacteriological test is unsatisfactory, repeat all steps beginning with Step E. Flush the well until the free chlorine residual drops below 0.5 mg/L.
- I. Request a sanitary survey from the Forest facilities engineer if subsequent bacteriological samples continue to show contamination.

Shut-down

- A. Perform condition survey.
- B. Tighten packing nut on Monitor 1DFHC and 1DFHF pump stands so packing forms a watertight seal while the hand pump is shut down for the season. Tighten packing nut until piston bar cannot be moved.
- C. Remove pump handle.

VI. MAINTENANCE

Like any other piece of machinery, hand pumps have maintenance requirements. Common maintenance procedures for hand pumps are described in the following paragraphs. Numbers in parentheses refer to part numbers of typical Monitor pumps shown in figures 8 and 9. The parts nomenclature of a Monitor pump cylinder is shown in figure 10. Figure 10 shows the components of a cast iron cylinder with a brass liner. Currently, all cylinder components are made of brass and the cast iron cylinders are no longer available from the manufacturer. Figure 10 is still useful because it depicts the majority of cylinders that will need service within the next ten years.

Drainage System—The drainpipe should be cleaned as needed to keep excess water draining away from the slab area.

Slab—The concrete slab should be replaced if open cracks develop in the slab. Hairline cracks in a steel reinforced slab generally should not be considered a threat to the sanitary quality of the well water. The ground level around the slab should be maintained at the elevation of the slab so surface water does not collect in low spots or form channels under the slab. Maintaining the ground level at slab elevation should reduce the chances of rodents burrowing under the slab.

Pump Stand—Nuts and bolts on the stand should be tight. Gaskets on the reservoir cover and the tank-to-base connection should be maintained in a watertight condition. Cracked components such as the pump base, reservoir cover, etc., should be replaced as soon as possible to protect the sanitary quality of the water.

Sealed Pump Flanges—Many older model pump stands had flanged pump bases that bolted directly to the concrete pad or to a sealed pump flange mounted on the top of the casing. The flange gaskets in these connections must be maintained to provide a watertight seal and prevent contamination of the well. Mounting bolts must be tight and the flange gaskets must be in good condition.

Disinfection of the Well—The well should be disinfected whenever the pump stand is raised or removed for maintenance. The procedure is described below.

1. Wash the exterior surface of the drop pipe and pump cylinder with a 100 mg/L chlorine solution as they are lowered into the well.

NOTE: 1/6 cup of 5-1/4 percent household bleach per five gallons of water is approximately a 100 mg/L chlorine solution.

2. Pour chlorine solution into well just before installing pump cylinder and drop pipe assembly. Chlorine solution shall be solution of one cup of 5-1/4 percent chlorine bleach or three 7 gram Olin HTH tablets diluted in 5 gallons of clear water into the well for each 20 feet of standing water. Disperse chlorine evenly through the well by pouring chlorine solution through a hose or pipe that is moved up or down in the well whenever possible.
3. After installation of the hand pump is completed, operate the hand pump until the distinct odor of chlorine is detected in the discharge.
4. Remove the pump handle and allow the chlorine solution to remain in the well for a minimum of 4 hours, preferably overnight.
5. After disinfecting, flush the well until the free chlorine residual is measured to be less than 0.5 mg/L. Take water sample for bacteriological testing at a certified laboratory. Remove pump handle.
6. If the bacteriological test is satisfactory, the water system may be opened for use and the pump handle reinstalled.

Well Cleaning or Flushing—Some wells are not adequately cleaned at the low pumping rate of hand pumps. Accumulations of sediment, rust particles, etc., eventually may affect the physical quality of the well water. At some sites, periodic cleaning of the well can be beneficial. Districts should consult with facilities engineers or zone environmental engineers on specific installations. Portable pump jacks with gasoline engines are available to mechanically operate the pump cylinder.

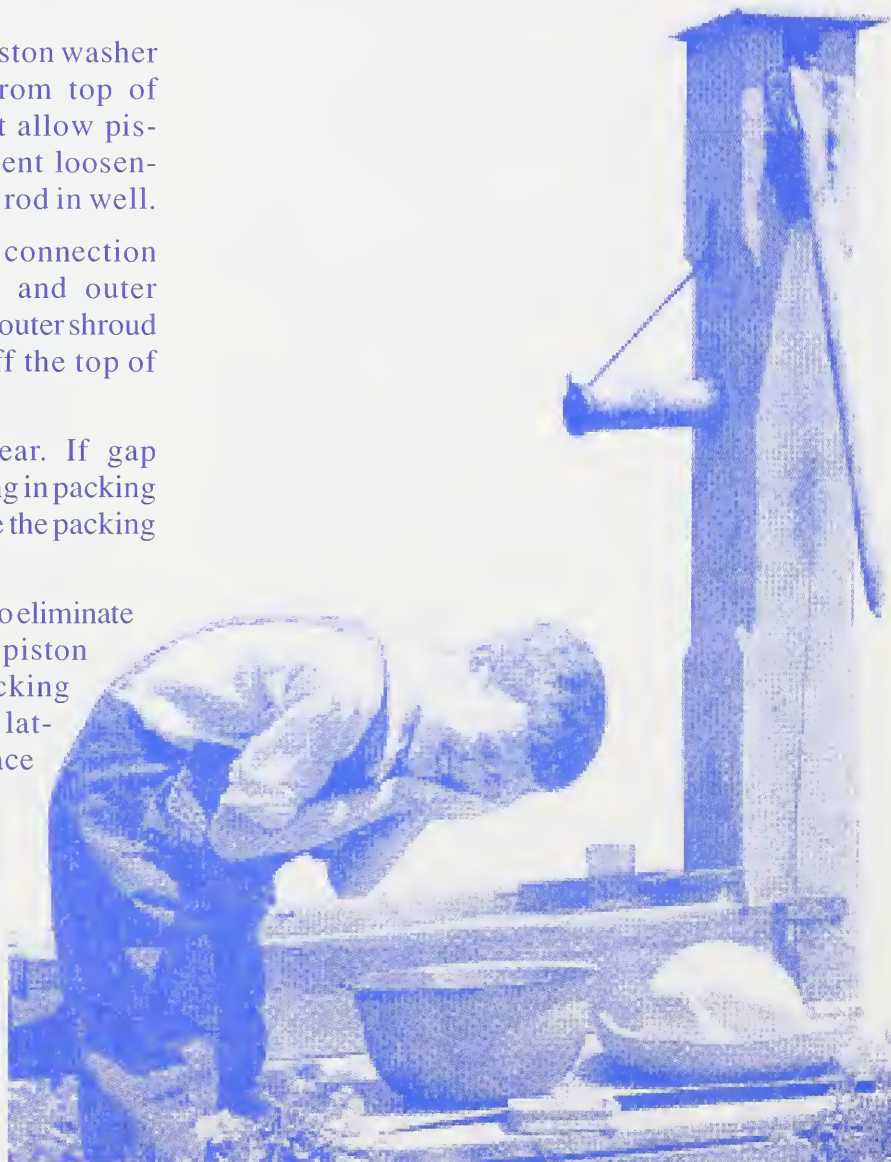
**Monitor Model 1DFHCS and 1DFHFS Pack-
ing Nut and Packing**
(Numbers in parentheses are key numbers
from figure 8.)

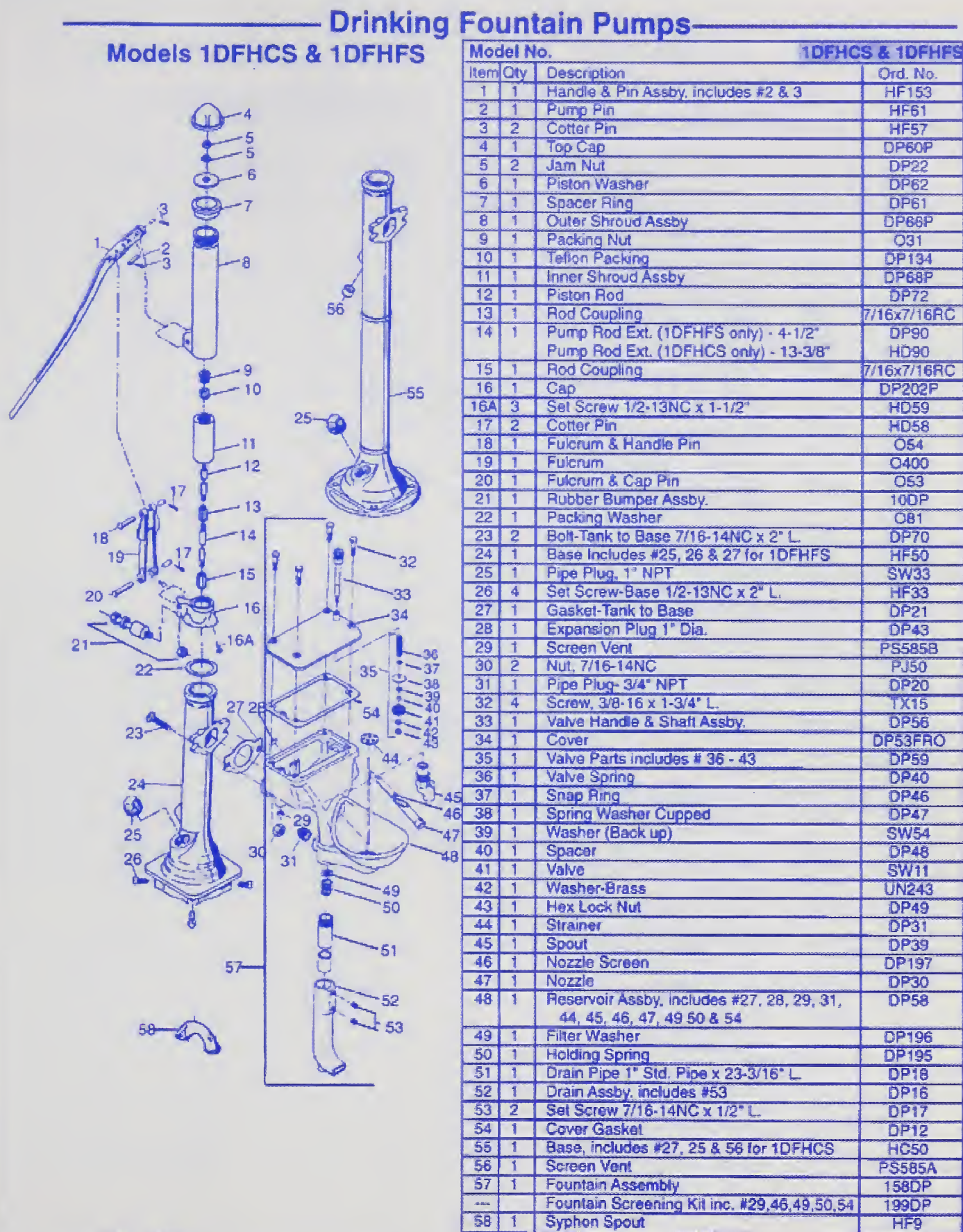
The shroud assemblies on Monitor 1DFHCS and 1DFHFS pump stands eliminate the potential for contamination of potable water from precipitation entering the drop pipe around worn out packing. The packing and packing nut will prevent small insects from entering the drop pipe if the packing nut is properly adjusted.

The packing nut adjustment is not as critical on shrouded pumps as on non-shrouded pumps. It is recommended that the packing nut and packing be inspected and replaced as needed during the spring condition survey.

A. Check/replace packing nut and packing.

1. Un-thread cap (4) from top of shroud assembly.
2. Remove two jam nuts (5), piston washer (6), and spacer ring (7) from top of shroud. CAUTION! Do not allow piston rod (10) to turn to prevent loosening threaded joints on pump rod in well.
3. Remove pump pin (2) at connection between pump handle (1) and outer shroud assembly (8). Remove outer shroud assembly (8) by lifting it off the top of the pump.
4. Check packing nut for wear. If gap between piston bar and opening in packing nut exceeds 1/16-inch, replace the packing nut.
5. Tighten packing nut as needed to eliminate lateral movement between piston bar and packing nut. If packing nut bottoms out before all lateral movement is gone, replace packing.
6. Complete the assembly by reversing the disassembly procedure. Apply a thin layer of waterproof grease (Lubriplate No. 105 grease is recommended) on rubbing surfaces between inner and outer shroud assemblies.





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OM17 (7-1-97)

Figure 8—Nomenclature for MONITOR models 1DFHCS and 1DFHFS pumps.

REPAIR PARTS LIST

Monitor

HAND PUMP STANDS

MODELS: 1DFHC and 1DFHF

Key Number	Ordering Number	Description	Quantity
1	HF153	Handle & Pin Assy. -includes Key No. 2 & 3	1
2	HF61	Pump Pin	1
3	DP32	Cotter Pin	2
4	O460	Upper Piston Guide	1
5	O200	Cap	1
6	HD59	Set Screw 1/2-13NC x 1 1/2	3
7	DP50	Flat Piston Bar	1
8	O31	Packing Nut	1
9	HD54	Valve Stem Packing, Graphite Rope 1/8 Dia. x 23" Long	1
10	HF52	Piston Bar	1
11	O53	Fulcrum & Cap Pin	1
12	O400	Fulcrum	1
13	O54	Fulcrum & Handle Pin	1
14	DP33	Cotter Pin	2
15	TX15	Hex Cap Screw 3/8-16 x 1 3/4 L.	4
16	DP56	Valve Handle & Shaft Assy.	1
17	DP53	Cover	1
18	DP40	Valve Spring	1
19	DP46	Snap Ring	1
20	DP47	Spring Washer Cupped	1
21	DP48	Spacer	1
22	SW11	Valve	1
23	SW54	Washer	1
24	DP49	Hex Lock Nut	1
25	DP12	Cover Gasket	1
26	DP31	Strainer	1
27	DP39	Spout	1
28	DP30	Nozzle	1
29	DP58	Reservoir Assembly -includes Key No's 27, 28, 33, 40, 41 & 26	1
30	DP18	Drain Pipe 1" Std. Pipe x 23 3/16" L.	1
31	DP16	Drain Assembly -includes Key No. 32	1
32	DP17	Set Screw 7/16-14NC x 1/2" L.	2
33	DP20	Pipe Plug - 3/4" NPT	1
34	O26	Pump Bushing 2" x 1 1/4"	1
35	HF33	Set Screw -Base 1/2 - 13NC x 2" L.	4
36	HF50	Base -includes Key No.'s 40 and 34 for DF-HF.	1
37	DP70	Bolt - Tank to Base 7/16 - 14NC x 2" L. with Nut	2
38	O81	Packing Washer	1
39	O12	Lower Guide Flange	1
40	DP11	Gasket - Tank to Base	1
41	DP43	Expansion Plug	1
42	HC50	Base -includes Key No.'s 40 & 34 for DF-HC.	1
43	DP59	Valve Parts - includes Key No.'s 18, 19, 20, 21, 22, 23 & 24	1
44	158DP	Fountain Unit Assembly includes Key No.'s 15, 16, 17, 25, 29, 30, 31, 32 and 43.	1
45	UN243	Washer	1

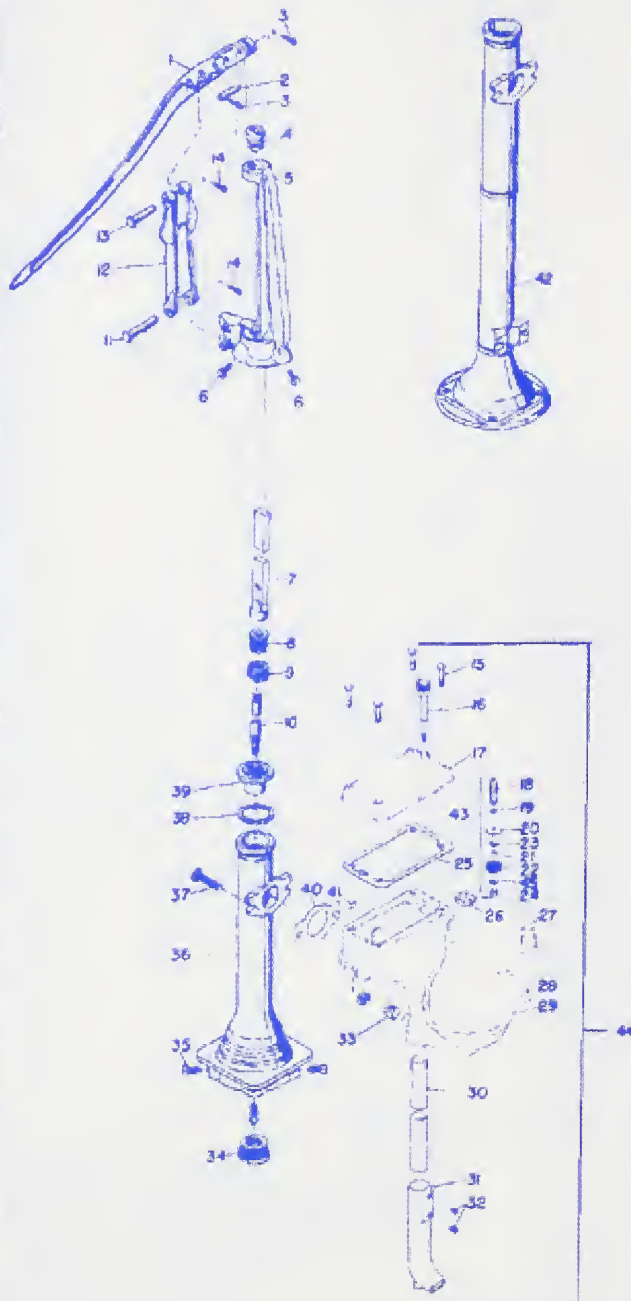


Figure 9—Nomenclature for MONITOR models 1DFHC and 1DFHF pumps.

**Monitor Model 1DFHC and 1DFHF Packing
Nut, Packing, and Upper Piston Guide
(Numbers in parentheses are key numbers
from figure 9)**

Properly maintaining the pump rod packing is one of the most important items in protecting the sanitary quality of the water from this hand pump. The packing nut (8) is located at the top of the pump base. The packing nut and packing (9) form a watertight seal where the piston bar (10) moves up and down through the top of the pump base (36). Normal maintenance will require the periodic tightening of the packing nut to compress the packing against the piston bar to maintain the watertight seal. The packing nut should be tightened to the point that there is no side movement in the piston bar through the nut and there is a slight drag on the piston bar when the pump is operated. If water bubbles around the packing, the packing nut is not tight enough.

The packing nut should not show much wear if the packing is properly maintained because the piston bar should rub against the packing, not the brass packing nut. If the packing nut is not tightened periodically, and the packing is not replaced when required, the brass packing nut will show wear. If the wear on the packing nut is allowed to continue, ultimately the hole in the packing nut and the lower guide flange (39) will become oval shaped. If this happens, the packing nut and the lower guide flange should be replaced because the packing may not stay in place if the oval becomes too pronounced.

The upper piston guide (4) will wear in the direction of the pump handle as the flat piston bar (7) rubs against the guide. As the upper piston guide wears, the piston bar (10) will tend to wear one side of the packing nut. The watertight seal at the packing nut may be disrupted if the packing nut wears to one side. A thin layer of waterproof grease (Lubriplate No. 105) on the upper piston guide and the handle side of the flat piston bar should prolong the life of the guide. Replace the upper piston guide when wear exceeds 1/8 inch.

Note: Upper piston guide (4) and flat piston bar (7) may be rotated 180 degrees one time to double the life of these two components.

The procedures for replacing the packing, packing nut, and upper piston guide are described below.

A. Replace packing.

1. Loosen packing nut (8) and slide nut up piston bar (10) to provide access to packing (9).
2. Remove remainder of old packing with a fine-pointed tool such as a small screwdriver, etc.
3. Install new valve stem packing (9) as recommended by pump manufacturer (Graphite rope 1/8" diameter x 23" long for Monitor brand pumps). Some districts have tried Teflon packing such as Zip Joint in place of graphite rope packing. The piston bar stays clean and there is no gummy residue left on the packing nut.
4. Slide packing nut down piston bar and tighten to form watertight seal.

B. Replace packing nut (and packing, if needed).

1. Remove pump pin (2) at connection between pump handle (1) and flat piston bar (7).
2. Remove upper piston guide (4) and un-thread flat piston bar (7) from piston bar (10).
3. Loosen packing nut (8) and remove by sliding up the piston bar (10).
4. Replace pump packing (9), if needed.
5. Install new packing nut by sliding down over the piston bar and tighten to form a watertight seal. Complete the assembly by reversing the disassembly procedure. The smooth surface of the piston bar (10) that slides through the packing (9) and the packing nut (8) should not be scratched or gouged with the jaws of pliers, pipe wrenches, etc. Damaging the surface of the piston bar will cause rapid failure of the packing.

C. Replace upper piston guide.

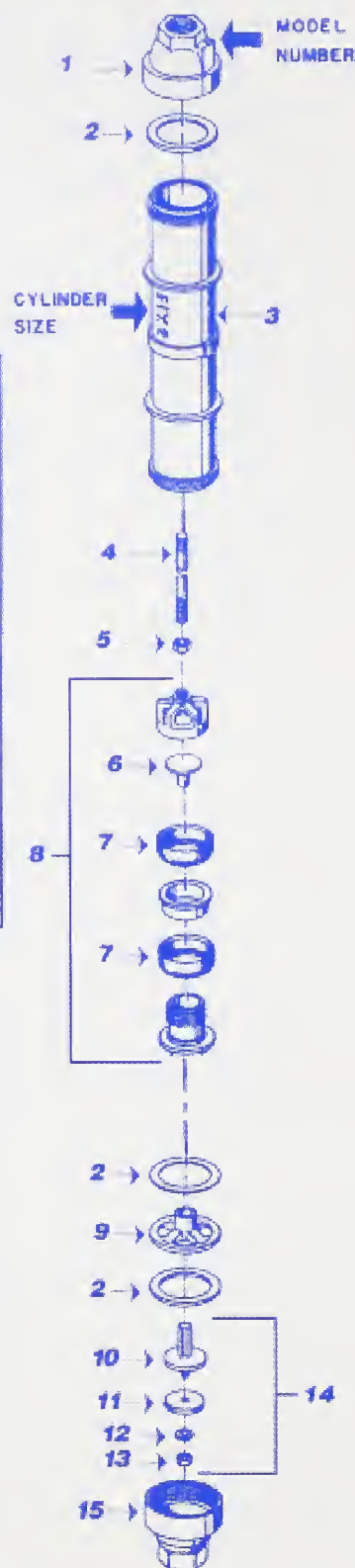
1. Remove pump pin (2) at connection between pump handle (1) and flat piston bar (7).
2. Upper piston guide (4) has to be rotated 1/4 turn inside pump cap (5) before the guide can be lifted out of the cap. On shallow wells, this can be accomplished by putting a round rod through the hole in the flat piston bar, lifting the flat piston bar about $\frac{1}{2}$ -inch with the round rod, and turning the flat piston bar counter clockwise 1/4 turn. On deep pump installations, loosen the three set

Cylinders

Cast Iron, Brass Lined

Cylinder Model Number	Cylinder Size	Stroke
755DB	2" x 15"	10"
755EB	2-1/4" x 15"	10"
755FB	2-1/2" x 15"	10"
755JB	3" x 15"	10"

Model No.			755DB	755EB	755FB	755JB
Item	Qty	Description	Ord. No.	Ord. No.	Ord. No.	Ord. No.
1	1	Upper Cap	CDFR0	CEFR0	CFFR0	CJFR0
2	3	Gasket	CD62	CE62	CF62	CJ62
3	1	Cylinder Barrel, Brass Lined	CD97FR0	CE17FR0	CF17FR0	CJ17FR0
4	1	Plunger Stem	CJ52	CJ52	CJ52	CJ52
5	1	Hex Nut, 7/16-14NC	PJ50	PJ50	PJ50	PJ50
6	1	Plunger Poppet	CD80	CE80	CF80	CJ80
7	2	Cup Leather	CD90	CE90	CF90	CJ90
8	1	Plunger Assembly	502CD	502CE	502CF	502CJ
9	1	Check Valve Guide	CD30	CE30	CF30	CJ30
10	1	Check Valve	CD24	FE24	FF24	FJ24
11	1	Check Valve Facing	CD70	FE70	FF70	FJ70
12	1	Check Valve Washer	CJ54	CJ54	CJ54	CJ54
13	1	Hex Nut, 5/16"-18NC	FJ34	FJ34	FJ34	FJ34
14	1	Check Valve Assembly	CD4	FE4	FF4	FJ4
15	1	Lower Cap Assembly	CD3FR0	CE3FR0	CF3FR0	CJ3FR0



OM1850 (1-1-95)



Figure 10—MONITOR pump cylinder components.

screws (6) at the base of the cap, and rotate the cap 1/4 clockwise, holding the flat piston bar so it does not turn.

3. Lift out the upper piston guide, replace or rotate 180 degrees, and put it back on the top of the pump cap (5). Complete the assembly by reversing the disassembly procedure.

VII. SPARE PARTS

The following is a list of common spare parts with key numbers that districts should consider stocking for hand pump maintenance.

<u>Item</u>	<u>Key Number</u> <u>(see figures 8 and 9)</u>
Packing nuts	9, 8
Graphite rope or Teflon packing	10, 9
Upper piston guide (not on shrouded pumps)	4
Reservoir cover	34, 17

Gaskets:

Reservoir cover	54, 25
Packing washer	22, 38
Tank-to-base	27, 40

Using a standard brand of hand pump on a district will reduce the inventory of recommended spare parts.

VIII. HAND PUMP MODIFICATION

A conversion kit shown in figure 11 is now available for installing the shroud on top of existing Monitor model 1DFHC and 1DFHF pump stands, converting them to model 1DFHCS and 1DFHFS pump stands. The shroud is a more positive method of protecting the sanitary quality of the water than the packing nut and packing. Some states will not allow pumps with only packing nuts and packing. This restriction led to the design of the shroud.

It is recommended that Monitor model 1DFHCS or 1DFHFS pump stands be specified when new hand pumps are purchased. Also, it is recommended that the shroud conversion kit be installed

when funds are available. The goal should be to ultimately install the shroud conversion kit on all hand pump stands that are adaptable to the kit. Installation instructions for the conversion kit are provided in figure 12.

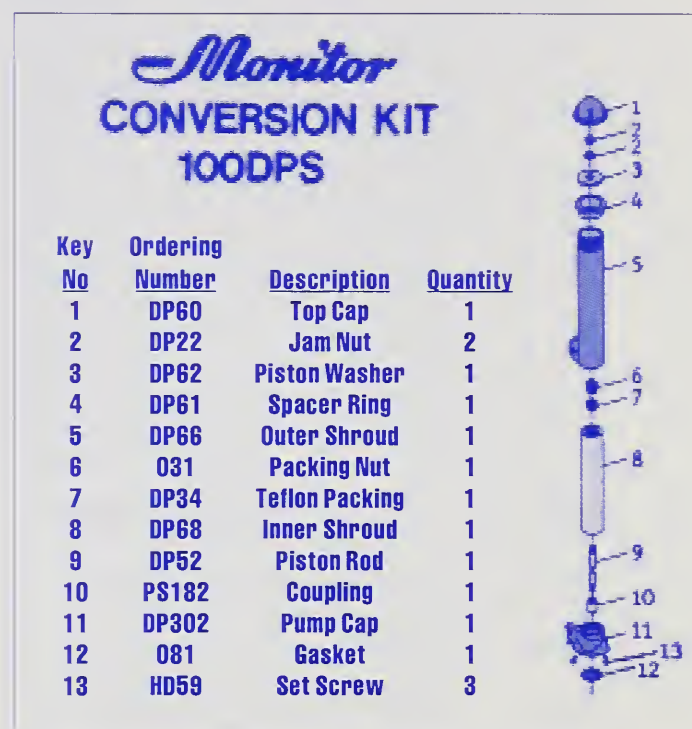


Figure 11—MONITOR pump conversion kit.

IX. PUMP DISASSEMBLY AND ASSEMBLY TIPS

Should it become necessary to totally disassemble the pump base to perform repairs or maintenance, helpful tips to make the job easier are discussed in this section.

The following figures illustrate the disassembly of a Monitor Model 1DFHF or 1DFHC pump base:

A typical hand pump installation is shown in figure 13. To start the job in addition to a toolbox stocked with the appropriate array of screw drivers, end wrenches, pliers, a socket wrench set, adjustable wrenches and other hand tools, the following special tools are recommended (see figure 14):

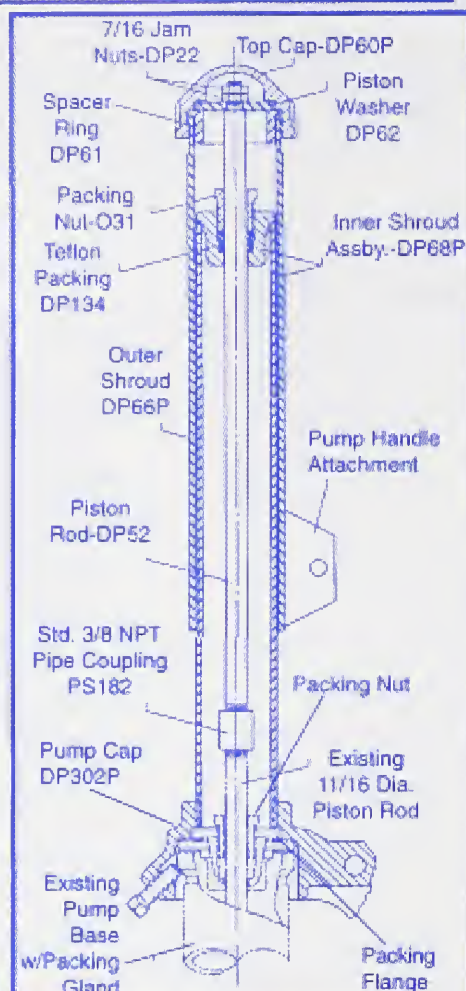
1. A ratchet operated jack (truck bumper jack will work) with approximately 24-inches of light steel chain.

Conversion Kit 100 DPS

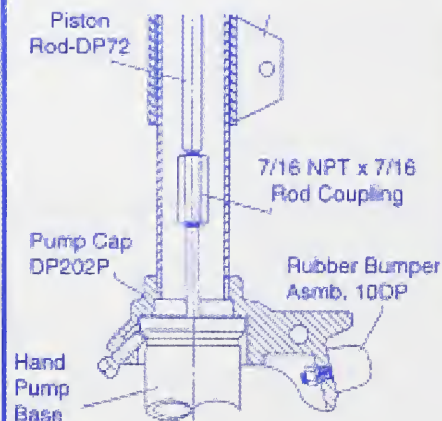
Model No.			100DPS
Item	Qty	Description	Ord. No.
1	1	Top Cap	DP60P
2	2	Jam Nut	DP22
3	1	Piston Washer	DP62
4	1	Spacer Ring	DP61
5	1	Outer Shroud Assembly	DP66P
6	1	Packing Nut	O31
7	1	Teflon Packing	DP134
8	1	Inner Shroud Assembly	DP68P
9	1	Piston Rod	DP52
10	1	Coupling 3/8"	PS182
11	1	Pump Cap	DP302P
12	1	Gasket	O81
13	3	Set Screw	HD59

INSTALLATION INSTRUCTIONS

- Step 1. Remove handle and fulcrum from existing installation.
- Step 2. Loosen set screws and remove cap from the pump.
- Step 3. Lift piston rod and attach vise grip to insure the piston rod does not drop through the packing gland.
DO NOT REMOVE EXISTING PACKING FLANGE AND PACKING NUT.
- Step 4. Remove the flat bar from piston rod.
- Step 5. Attach 3/8 coupling to the piston rod.
- Step 6. Attach piston rod from conversion kit to 3/8 coupling.
- Step 7. Remove vise grip.
- Step 8. Install pump cap assembly DP302P.
- Step 9. Enter teflon packing around piston rod at top of cap.
- Step 10. Screw in packing nut O31.
- Step 11. Install outer shroud DP66P.
- Step 12. Install spacer ring DP61.
- Step 13. Install piston washer DP62.
- Step 14. Fasten (2) jam nuts DP22 to top of piston.
- Step 15. Raise outer shroud and attach top cap DP60P tighten securely.
- Step 16. Replace fulcrum and attach handle to outer shroud.



View of Conversion
Kit for Existing Installations



Drinking Fountain Hand Pump
with Shroud

OM16 (1-1-95)



Figure 12—MONITOR pump conversion kit installation instructions.



Figure 13—Typical hand pump installation.



Figure 14—Disassembly tools recommended.

2. A 1-inch x 1-inch x 3/16-inch minimum thickness x approximately 18-inches long piece of steel angle, fitted with a U-Bolt of the proper size to clamp the pump drop pipe firmly to the angle.
3. One 18-inch and one 24-inch pipe wrench.
4. One stainless steel pail and an adequate supply of household bleach for pump and well disinfection.
5. You will also need one tube of Lubriplate No. 105 lube with you for lubrication of the pump parts when you reassemble the pump (figure 21).

The pump is disassembled in the following steps:

1. Remove the pump handle following the previous instructions.
2. After the handle has been removed, remove the pump cap, upper guide, flat piston bar, and fountain/reservoir assembly from the pump stand (figure 15). Remove the packing nut and packing. These procedures were discussed in detail earlier.



Figure 15—View of pump after removal of the pump cap, upper guide, flat piston bar, packing, packing nut and fountain/reservoir assembly.

3. Now fix the jack to the pump base with the steel chain (see figure 16). The chain is fixed to the jack with an appropriate length and size bolt and nut. Position the jack as shown in figure 17 to prevent the chain from slipping when jacking the base.



Figure 16—Attachment of the jack to the pump base.

4. Make sure you have removed the set screws from the pump base. Jack the pump base upward approximately 12-inches. Then as shown in figure 18, firmly clamp the 1-inch angle bar to the drop pipe with the u-bolt. This will prevent the drop pipe from falling into the well casing during the removal of the pump base and round piston bar.

5. Remove the jack. Firmly grip the drop pipe with the 18-inch pipe wrench and the pump base with the 24-inch pipe wrench as shown in figure 19. Prevent the drop pipe from turning and rotate the base counter clockwise until it releases from the drop pipe (figure 20). Lift the base off. The pump and well are now ready to service. During reassembly, lubricate the pump rod and other moving parts with Lubriplate No.105 (figure 21). Use a similar procedure for the reassembly of the pump.



Figure 17—View of the chain securing the jack to the pump base.



Figure 18—U-bolt attachment of the steel angle to the drop pipe.



Figure 19—After jack removal, pipe wrenches are applied to the pump base and drop pipe to facilitate rotation of the base to release the drop pipe.



Figure 20—View of clamped drop pipe and pump rod with pump base removed.



Figure 21—LUBRIPLATE No. 105 is used to lubricate the pump during reassembly.

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